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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/087,660	03/01/2002	Michael John Towler	YAMAP0804US	7895

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EXAMINER	
DUONG, THOI V	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,660	TOWLER ET AL.	
	Examiner	Art Unit	
	Thoi V Duong	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-20 and 24-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-20 and 24-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *0904*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 19, 2004 has been entered.

Accordingly, claim 1 was amended and claims 2 and 21-23 were cancelled. Currently, claims 1, 3-20 and 24-26 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3-10, 12-17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Acosta et al. (EP 0996028A2) in view of Funada et al. (USPN 4,232,947).

Re claims 1, 3 and 4, as shown in Fig. 1, Acosta et al. discloses a liquid crystal device comprising a nematic liquid crystal 3, voltage means for applying a voltage across said liquid crystal, and two substrates 1, 1' each provided with an alignment

layer 2, 2' (col. 1, paragraphs 1-5), wherein, as illustrated in Fig. 9, a modification of Fig. 7:

said liquid crystal is sandwiched between said two substrates;

said nematic liquid crystal can be placed in at least one operating state and at least one non-operating state (cols. 1 and 2, paragraphs 8 and 9);

at least one of said alignment layers is provided with a plurality of surface protrusions 8, 8' formed from an anisotropic material as shown in Fig. 9 (cols. 13 and 14, paragraphs 81 and 82); and

said protrusions affect alignment both near the surface where a high pre-tilt in region B is produced and within the bulk of the liquid crystal where the V-state grows from region B into adjacent regions A and C (col. 12, paragraph 73 and col. 13, paragraph 81).

Re claims 5 and 16, Acosta et al. discloses that at least some of said protrusions nucleate said liquid crystal into said operating state from said non-operating state when said voltage exceeds a threshold value and said operating and non-operating states are topologically distinct from each other (cols. 1 and 2, paragraph 8 and 9; col. 4, paragraph 22; and col. 12, paragraph 73).

Re claim 6, Acosta et al. discloses that at least some of said protrusions isolate said operating state from said non-operating state or from another operating state (col. 12, paragraph 73).

Re claims 7 and 8, Acosta et al. discloses that said liquid crystal is divided into a plurality of pixels each having an active region, and wherein the active region of each

said pixel contains, or overlaps with, or lies adjacent or close to, at least one of said protrusions, so that nucleation occurs within said active region and wherein each said pixel is surrounded by at least one of said protrusions, so that the pixel is isolated (Fig. 10 and col. 14, paragraph 83).

Re claims 9 and 10, Acosta et al. discloses that said nematic liquid crystal is a pi-cell or splay bend device (SBD) (col. 1, paragraphs 1-3).

Re claim 15, Acosta et al. discloses that the anisotropic protrusions are formed from a polymerisable reactive mesogen (cols. 13 and 14, paragraphs 81 and 82).

Re claim 17, Acosta et al. discloses that when said voltage is substantially zero different regions of said liquid crystal exist in first non-operating state (region B) and second non-operating state (region A or C), and the first non-operating state is stabilized by said anisotropic protrusions 8, 8' as illustrated in Fig. 9, which is a modification of the device shown in Fig. 7, wherein said first and second non-operating states are V and H states respectively and wherein said first non-operating state is the same state as said operating state (col. 12, paragraph 73).

Re claim 20, Acosta also discloses a method of producing the liquid crystal device in Fig. 9 comprising the steps of forming a reactive mesogen layer 8, 8' on substrates 1, 1', curing said layer by irradiating said layer with UV light through a mask to leave said one of said substrates coated with anisotropic protrusions, and forming a liquid crystal cell by sandwiching nematic liquid crystal material between said two substrates (col. 14, paragraph 82).

Re claim 24, the protrusions 8, 8' in Fig. 9 of Acosta et al. are trapezoidal anisotropic protrusions.

Acosta et al. discloses a liquid crystal device that is basically the same as that recited in claims 1, 3 and 4 except for protrusions having a height which is at least 10% or 20% or substantially 50% of the thickness of the liquid crystal.

As shown in Figs. 4-6, Funada et al. discloses a nematic liquid crystal device comprising a multiplicity of protrusions having an anisotropic profile and the height of 10 through 10,000 Angstroms (1 micrometer) for the purpose of regulating or defining the alignment of the liquid crystal molecules so as to eliminate the degeneration states of the liquid crystal molecules (col. 2, lines 61-66).

As known in the art, the two substrates of the liquid crystal display device are typical 1-6 micrometers apart. Accordingly, if the protrusions have a height of 0.6 or 1 micrometer and the two substrates of the LCD device is 6 or 5 micrometers apart, respectively, the protrusions will have the height which is at least 10% or 20% of the thickness of the liquid crystal. Similarly, if the protrusions have a height of 1 micrometer and the two substrates of the LCD device is 2 micrometers apart, the protrusions will have the height which is substantially 50% of the thickness of the liquid crystal.

Re claims 12-14, Funada et al. discloses that the protrusions are tilted anisotropy protrusions (col. 3, lines 32-46) or twisted anisotropy protrusions (col. 3, line 61 through col. 4, line 30).

Finally, re claims 25 and 26, the protrusions in Fig. 4 of Funada et al. are triangular or mitre-shaped anisotropic protrusions.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Acosta et al. with the teaching of Funada et al. by forming anisotropic protrusions having a height which is at least 10% or 20% or substantially 50% of the thickness of the liquid crystal for the purpose of regulating or defining the alignment of the liquid crystal molecules so as to eliminate the degeneration states of the liquid crystal molecules (col. 2, lines 61-66).

4. Claims 11 and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Acosta et al. (EP 0996028A2) in view of Funada et al. (USPN 4,232,947) as applied to claims 1, 3-10, 12-17, 19 and 20 above, and further in view of Ulrich et al. (USPN 6,618,113 B1).

The liquid crystal device of Acosta et al. as modified in view of Funada et al. above includes all that is recited in claims 11 and 18 except for a bistable twisted nematic (BTN).

As shown in Figs. 12 and 16, Ulrich et al. discloses a liquid crystal device comprising a bistable twisted nematic (BTN) liquid crystal layer 23 and twisted anisotropic spacer walls 10 (col. 7, lines 35-46 and col. 9, lines 43-47) so as to avoid substantial reduction in contrast ratio (col. 4, lines 27-32).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the liquid crystal device of Acosta et al. with the teaching of Ulrich et al. by employing a BTN liquid crystal and twisted anisotropic protrusions to create a first non-operating state as T state and improve contrast ratio for the display (col. 4, lines 27-32).

Response to Arguments

5. Applicants' arguments filed July 19, 2004 have been fully considered but they are not persuasive.

Applicants argued that Acosta et al. and Funada et al. fail to teach or suggest protrusions to affect alignment near the surface and within the bulk of the liquid crystal layer as recited in claim 1. The Examiner disagrees with Applicant's remarks since, as shown in Fig. 9, Acosta et al. discloses the protrusions 8 affecting alignment both near the surface in region B where the V-state of high pre-tilt is produced (col. 13, paragraph 81) and within the bulk of the liquid crystal where the V-state grows from the region B into the adjacent regions A and C when a voltage is applied across the liquid crystal layer (col. 12, paragraph 73). Thus, the combination of Acosta et al. and Funada et al. still meet all limitations recited in the claims.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached at (571) 272-2293.

Thoi Duong

11/22/2004 TD

TARIFUR R. CHOWDHURY
PRIMARY EXAMINER